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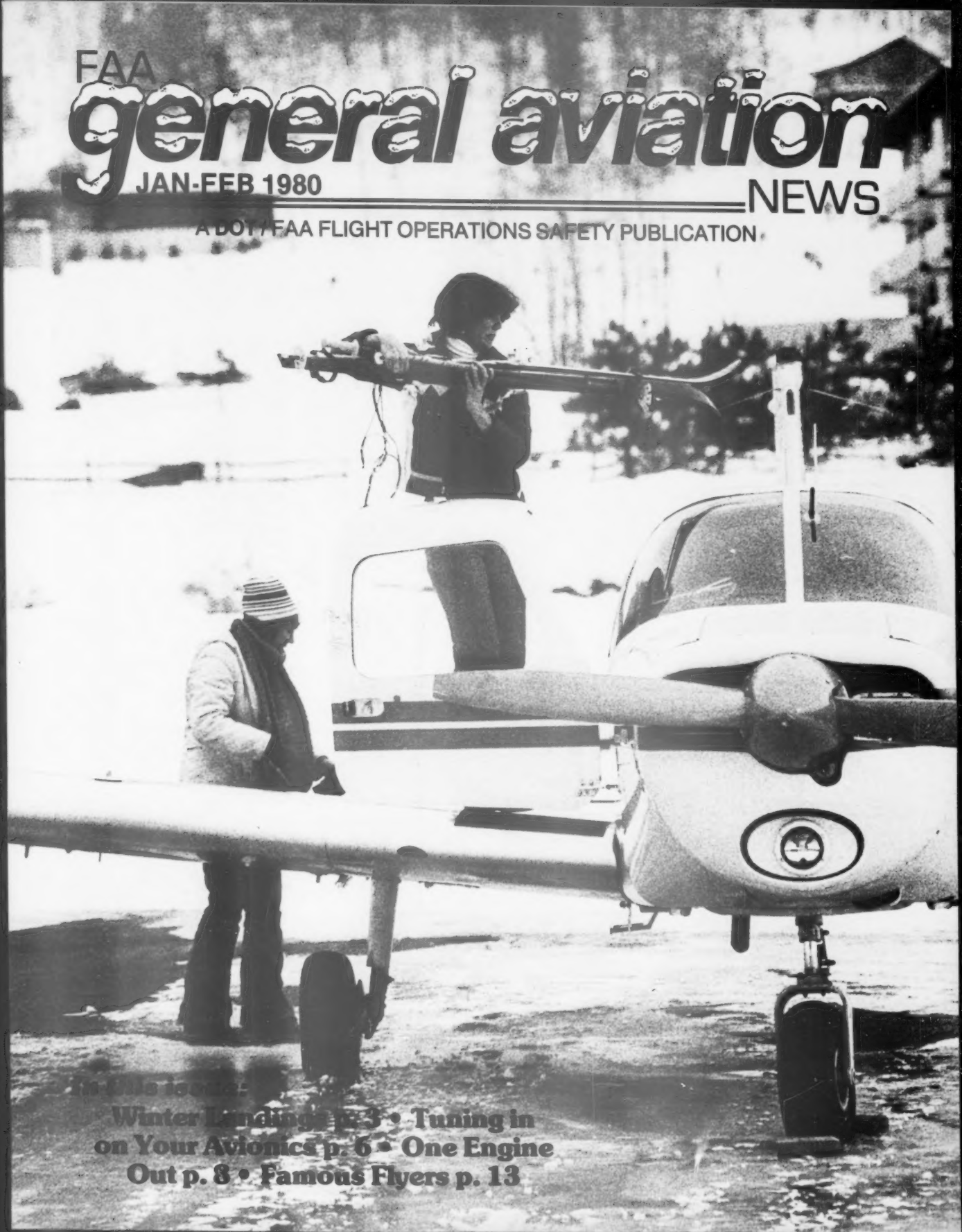

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DEPARTMENT OF TRANSPORTATION/ FEDERAL AVIATION ADMINISTRATION

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BRIEFS

AVOIDING EXPERIMENTAL RADAR. A hazard zone for aircraft carrying electro-explosives or using high frequency exists in Somerset County, Me., where the U.S. Air Force is testing an experimental radar. The tests, which will continue until June of 1981, are on an intermittent basis 40 hours a week. Check Graphic Notices and Supplemental Data for specific location and avoidance altitudes.

CHOPPED BAGGAGE. A recent light twin accident was caused by a nose baggage door popping open in flight, causing loss of control, a crash, and loss of life to all on board. Investigation revealed that excess play between the door key mechanism and the latch lever allowed the door to close and appear locked after the key latch was already in the locked position, preventing complete door closure. Some 525 malfunction reports in the past 24 months indicate this is a potential problem in all aircraft, which can usually be prevented by regular inspection and strict adherence to rigging and adjustment instructions.

VACUUM PUMP PRECAUTIONS. Incorrect engine cleaning procedures can introduce harmful solvents to the dry air vacuum pumps that power some light aircraft instruments. Unless the vacuum pump is covered during cleaning, the seal, carbon bearing, vanes, and rotor in the pump could be damaged, causing premature pump failure with little or no warning. Failure of the vacuum pump means loss of the attitude gyro, directional gyro, and turn-and-bank indicator. Bound to be a challenge aloft.

BURIED ALIVE. During a routine 100-hour airplane inspection, an ELT battery was tested, found to be without vital signs, and discarded in a hangar trash can. The next day someone spotted smoke in the hangar and discovered fire smoldering among oily rags in the waste can. An empty metal drink container had shorted the apparently dead battery's terminals, causing overheating and a potential conflagration of some pretty expensive airplanes. Batteries of any kind should be discarded in a special plastic container kept free of metal objects that can short even a partially discharged battery.

NEW PART 125. Deadline for comments on this proposed rule change, which would make aircraft size the criteron for determining safety standards, is February 19, 1980. See Nov./Dec. issue for details.

Winter Landings

Controlling the Airplane on a Slippery Surface

Nothing spoils a winter vacation or business trip in your own airplane as completely as a landing mishap at the final destination. You carry out a long, well-planned and well-executed flight in a thoroughly professional manner, impressing friends and family, only to wind up in some ridiculous position with your tail in the air and the ceiling where the floor ought to be. Even if no one is hurt, your pride is pricked and your wallet is bound to suffer.

Landing accidents tend to increase in the winter, especially in the north or in mountainous areas, whenever the temperature drops down below freezing. The chill factor in landings is something that many pilots ignore when planning winter flights, especially if the weather at their home airport is on the balmy side. If they encounter ice or snow on touchdown they could find the airplane suddenly developing an apparent will of its own as to where this particular trip is going to end.

Putting a ton or more of airplane down on snow or ice, without losing directional control, is no simple matter, even in the absence of crosswind problems. To do it safely you have to develop a sensitive toe for braking plus quick and accurate responses on *all* the flight controls—not merely the rudder. A light plane skittering over glare ice is as much a challenge to control as any condition you are likely to find in general aviation flying. Meeting it successfully takes understanding, training, and recurrent practice. It does not come naturally.

During the five winter months of 1977 (November through March) there were 103 landing accidents on snow or icy conditions according to reports of the National Transportation Safety Board. The majority of these accidents were a direct result of the pilot's inability to maintain directional control of the airplane during the landing roll. Equipment failure was rarely involved, although it sometimes seemed so to the pilot. Typically the pilot found his airplane drifting off the centerline on roll-out and attempted to retain control with the use of brakes and rudder only. Examples:

• **Billings, Mont.** A 700-hour pilot with a commercial certificate attempted to land at a nearby ranch strip, on a near-zero temperature day in December. He had flown into this strip on at least 40 previous occasions within the past 90 days without mishap. But on this wintry day the wind was blowing at 20 knots, gusting to 30, from 270°, and there was ice and slush on the ground. The *Cessna 206* was blown off icy Runway 33 to the right, where it collided with a rock fence, causing considerable damage to the landing gear; fortunately no injuries.

• **Van Wert, Ohio.** The pilot of a *Grumman American* had no crosswind problems as he approached the airport with the westerly wind blowing right down the runway at his nose. But it was evening and there were patches of ice on the pavement. After touchdown the airplane began to turn toward the left. The pilot applied full right rudder and brake, without effect. He then applied full power for an attempted go-around, but before he could rotate the airplane struck a snowbank and turned over. Minor injuries, substantial damage.

• **Martinsburg, Pa.** During the landing roll the *Cherokee* veered to the left across the snow-covered runway. The student pilot applied full opposite rudder, but the left gear smashed into a block of frozen snow, snapping off. The wind was reported as nine knots at 290°, ten degrees to the right of the runway. Substantial damage, no injuries.

The preparation for landing on snow with wheels is similar to landing on wet or muddy fields. Touchdown should be made at the lowest possible airspeed, with a nose-high attitude maintained by power as required. Braking effect may be nil and probably should be avoided altogether until the airplane slows down, since the surface is unpredictable and a sudden catching of the brakes on a bare patch of surface could throw too much pressure on the nose wheel,

Flying into a ski resort airport may be your first experience with icy pavement and contrary winds. Advance preparation will help avoid leaving a sitzmark off the runway.

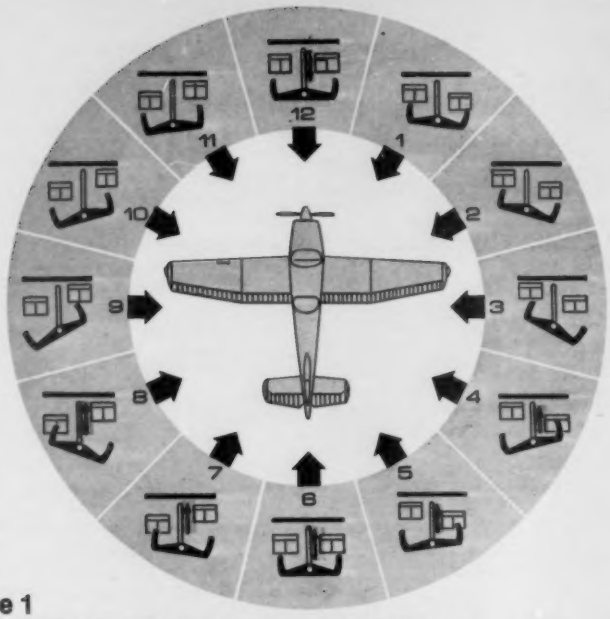


Figure 1
Control settings for ground run under varying conditions. Large arrows show wind direction.

or pull the plane to one side. Every effort should be made to line up with the centerline before touchdown.

Even at low speeds, braking action on slippery runways requires a very sensitive touch to avoid initiating a skid, and in some conditions any braking or nose-wheel steering, may be non-effective. Rudder action always gives some control, but whenever the wind (including the airflow component from the moving airplane) is more than nine knots, rudder should be used in conjunction with *aileron* and *elevator,* when taxiing as well as rolling on the runway.

Controlling an airplane on an icy or snowy surface is much like handling a plane on water or on skis: the controls must be manipulated in such a manner as to prevent the wind from turning the plane around on its axis or raising a wing or the tail. In general the technique consists of raising the upwind aileron, together with opposite rudder and back pressure on the wheel—whenever the wind component is in a forward quadrant. This prevents the wind from lightening wheel pressure on the upwind side and from pushing the tail around or up in the air. (See diagram).

With a quartering wind, the upwind aileron is deflected down to avoid raising the wing; the rudder is coordinated and the elevator depressed. Note that with the wind abeam, the controls are manipulated as they would be with a headwind component, since the forward motion of the airplane will produce this effect. The pilot must be alert to sudden wind shifts, and remember to adjust controls appropriately after turning onto or off a taxiway.

Apart from insufficient skill, the main type of pilot error involved with icy runway landings appears to be lack of preparation. Many of the winter accidents were due to the pilot's dearth of knowledge of landing conditions at his destination airport. Often the pilot had decided to save himself the expense of a telephone to an uncontrolled airport, expecting to be able to assess field conditions from the air. But snow depth and consistency is not all that perceptible from the air, and if the UNICOM is unattended or non-existent, there is always psychological pressure on the pilot to belittle the hazard and chance the landing. Some of the unpleasant surprises he is likely to encounter are:

• **Too much snow.** The pilot of a *Luscombe 8A* made two low passes over the small private airport near Slippery Rock, Pa., to examine the snow depth. He observed that the snow was barely up to the wheel hubs of several parked aircraft, and decided that indicated a tolerable two to three inches on the runway. There was no active UNICOM to confirm his estimate. He made a careful, straight-in approach, touched down into more than a foot of heavy snow and flipped over before traveling 100 feet. Minor injuries, heavy damage. The pilot admitted later that if he had telephoned the airport earlier or examined the snowcover more cautiously he would not have chanced the landing.

• **Hard crust.** A business flight in a *Cessna 150* also ended in a nose-over near Glasgow, Montana. The pilot, who had obtained no advance information regarding runway conditions at a ranch strip, could see that the snow on the frozen turf was not more than three or four inches deep; but what he did not suspect was the presence of a heavy crust over light snow, as a result of day-time thawing in the December sunshine and night freezing. His light plane stayed on top of the snow for several hundred feet after landing, then the nose wheel broke through the crust and over he went. *No injuries but no profits on this trip, after a hefty repair bill.*

• **Locked wheels.** A brand new *Cessna 172* aged very fast on a February day in Ohio, following a crash landing at Urbana Airport with an inadvertent braking application to one wheel. The pilot had not thought to remove the wheel fairings before departing from a slushy airport. By the time he was ready to land, the slush had frozen around the left wheel to the extent that it would not turn. The airplane skidded off the runway and come to rest inverted in deep snow.

• **Underinflated struts.** The pilot of a *Cherokee,* taking off from a snow-covered airport near Pontiac, Michigan, did not notice, in his admittedly brief preflight check (the temperature was about 20°F), that the right wheel strut was not normally extended. When he returned to land, the airplane swerved to the right shortly after touchdown and crashed into a snowbank—fortunately it was only partially frozen. *Expensive repairs; injury to pride only.*

• **Downhill runway.** There was only a thin, icy glaze on the runway when the pilot set his *Tripacer* down on the small airport near Coeur D'Alene, Idaho. He touched down on the numbers and rolled out smoothly along the centerline. However, the airplane did not appear to slow down appreciably as he applied brakes, and he was unable to prevent an overshoot into a stand of pines. He was unaware, until it was pointed out to him by the investigating inspector, that the runway had a four-degree downslope in the direction he had landed—under virtual no-wind conditions. In a contest between brake friction on ice and gravity, gravity usually wins. Determining the slope of a runway from the air in snowy terrain is just about impossible, particularly in the mountainous areas surrounding ski resorts.

Accidents of this kind are often not taken seriously because the injury rate is low, but the potential for tragedy is always there. And in any case they are the quickest way to spoil what starts out as the perfect holiday. The tendency to regard skidding on ice as "unavoidable" is a mistake. Like ice skating, all it takes is professional instruction, plus determined practice. The technique is known. □

Tuning In On Your Avionics

Is there anything more exasperating than investing in a bundle in first-rate avionics equipment, including transponder and ADF, in the interest of flying safely in all kinds of weather and through all kinds of traffic jungles, only to find that the new equipment brings new or worse problems? ***Interference, fade-out, intermittent or weak signals, messages from outer space,*** etc. You have the units pulled and bench-tested and checked out in the airplane and on the ground; no problem surfaces until you are aloft in some situation where you really need the radios. Are the manufacturers and mechanics in league against you, or are there gremlins in avionics?

If you think it is gremlins, one good place where the pilot or owner can start looking for them is *outside* the cabin, in the antennas. Broken, bent, loosened, or otherwise weakened antennas have probably caused more problems with radio communication than the transceivers themselves —mainly because they are externally mounted and vulnerable to damage from the environment and from people.

It is difficult to believe that a few cents worth of bent wire can disrupt the functioning of thousands of dollars worth of avionics, but nevertheless, it does happen. Just how antennas work, how they propagate radio waves across hundreds of miles of airspace is something we are unable to explain in simple language. But certain facts about the behavior of antennas are known and should be understood by pilots:

1. Optimum performance for a radio is very unlikely unless the antenna is correctly designed and properly mounted.

2. Antenna function is easily degraded by corrosion at the mounting, loose fastenings leading to vibration, slight bending out of shape, and even unsuitable paint.

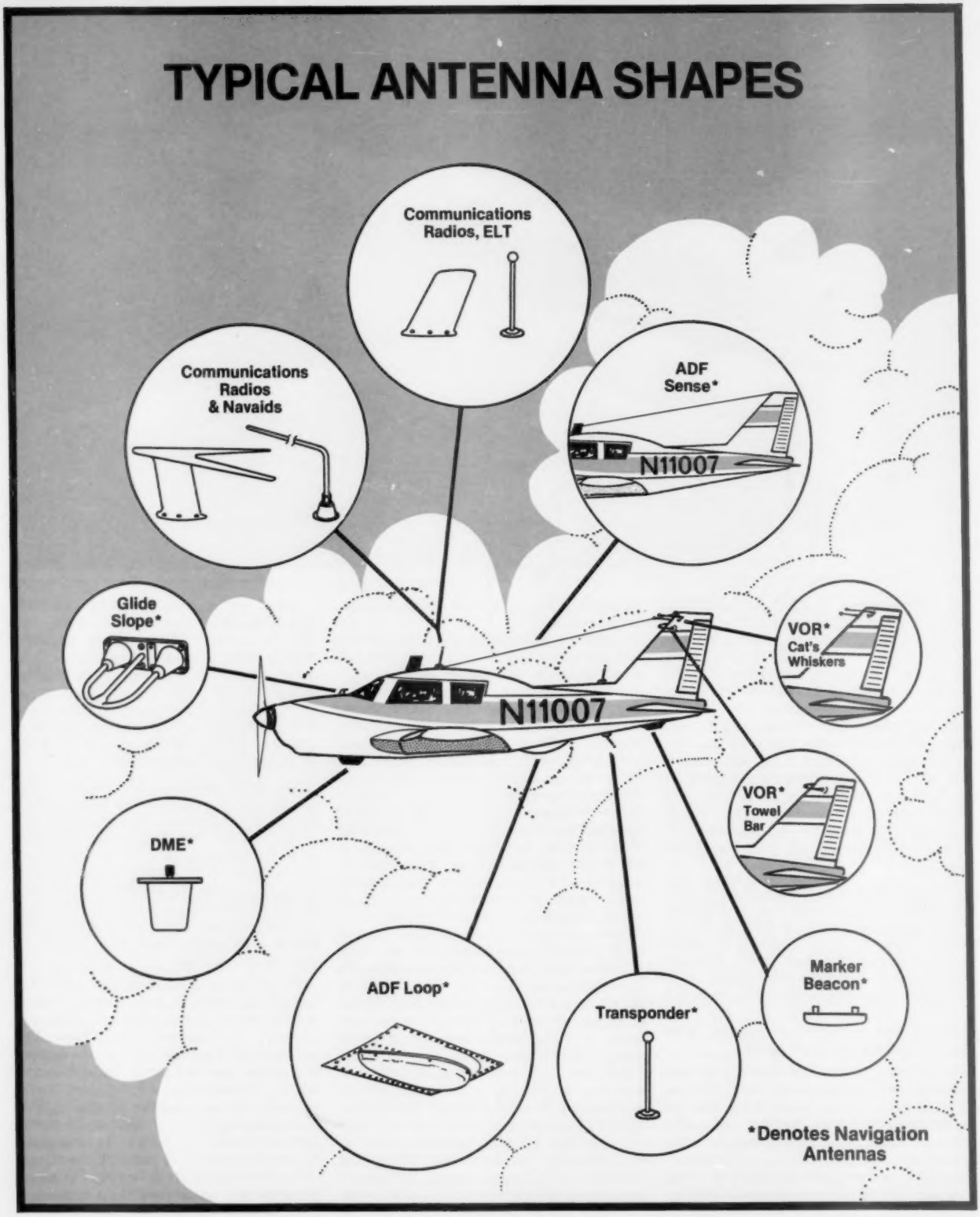
In other words, before you spend a lot of money on new or better avionics, why not try to see how much you can improve the performance of your present equipment by checking over the antennas carefully? You might be very agreeably surprised at the results, and in any case you will have acquainted yourself with a pilot maintenance aspect of aircraft inspection that is much overlooked.

The first time around you might want to have a certificated mechanic at your side, partly to make sure you do not undertake any maintenance you are not allowed to do, but also to help you identify the different antennas. A modern aircraft may have nearly a dozen visible antennas. *Why so many?* Ideally there is a given antenna length for each radio frequency that we may use. In common practice this optimal performance is located at the center of a desired range of frequencies, but this range is limited and reception weakens rapidly as you approach the limits. The higher the *frequency* of the radio signal, the shorter the antenna *length*.

Most modern aviation communications and navigation radios operate in the very high frequency (VHF), which permits a shorter antenna, reduces drag, and simplifies installation. VHF frequencies are also less susceptible to atmospheric static. Their primary drawback is that their propagation is limited to line of sight, and is cut off by terrain obstacles or the curvature of the earth at a moderate distance.

The basic communication radio is connected to a short vertical wire whip mounted on top of the forward cabin. The lower portion of this wire may be bent aft at an angle or be in the shape of a "V" in which case the antenna is also serving one or more navigation radios. In general aviation communications radios primarily are designed to transmit and receive ***vertically polarized*** signals while many navigation signals are horizontally polarized.

If you have dual communications and navigations radios, your best results will be obtained with separate antennas mounted in opposing positions on the fuselage. This isolation will minimize antenna interference. When they are co-located, even if operating on different frequencies, there is the possibility of one receiver picking up part of a strong signal from a different frequency in certain conditions of flight. In some cases, a sensitive receiver, is more likely to pick up stray signals from nearby antennas. Normally, *but not always,* these factors are


TYPICAL ANTENNA SHAPES
Communications Radios, ELT
Communications Radios & Navaids
ADF Sense*
N11007
Glide Slope*
VOR* Cat's Whiskers
N11007
VOR* Towel Bar
DME*
ADF Loop*
Transponder*
Marker Beacon*
*Denotes Navigation Antennas

Typical topside installations. New designs (inset) combine the communications antenna with ADF loop and sense.

taken into consideration during the installation of the radios.

The efficiency of your radio at any given frequency can be measured by your mechanic with an instrument which determines the Standing Wave Ratio—the ratio between the power output at the transmitter and the antenna. The higher the ratio, the greater the power loss; a 2.0:1 ratio is satisfactory; any larger ratio would be poor. If your readings are bad, there could be problems with the antenna or the connecting cable; if the readings are good, before you consider better radio equipment, check with your aircraft manufacturer as to the suitability of your antenna range. Optimum positioning of antennas differs very significantly from one make and model of airplane to another for reasons that are not fully understood. Space age electronics has also introduced corrosion free, longer lasting antenna materials now available for general aviation radios.

Streamlined fiberglass housings are now used on many antennas to protect them from dirt and ice accumulations, which can interfere with their function by setting up undesirable vibrations in flight.

The DME, ADF loop, transponder, and marker beacon antennas are frequently placed on the underside of the aircraft; the glide slope antenna is on the nose (or on the inside of the windshield). The VOR antennas are either on top of the cabin or on the vertical fin. The long wire still seen on some airplanes extending from the cabin roof to the top of the vertical fin is the older type of ADF sensing antenna; more modern versions position them inside the loop housing.

The exposed wire or metal rod type of antenna is the most susceptible to weathering and mechanical damage. Check to make sure it has not been bent out of shape or has a piece broken off, and make sure that the mounting is secure and shows no sign of corrosion. If you started having radio troubles after flying near some heavy thunderstorms, you may have taken a lightning strike, so look for indications of burning or disfiguring. Make sure the airframe area around the mount is still firm and retains its shape.

Fiberglas housing should be examined for cracks that would let in moisture, dents that could cause vibration, and the security of the mounting itself. Belly-mounted antennas are most susceptible to damage from hard landings, off airport landings, or flying debris from run up. They also tend to become caked with mud or frozen slush, which could distort their signal if the foreign material contained certain metallic substances. Even coating them with the wrong kind of paint (with a metallic base) would have this effect.

After you have made a careful visual inspection of your antennas and are on a first-name basis with them, make a ground check of your radios with the master switch on and ignition, generators, cabin and navigation lights, etc., *off*. A loose connection in any of these electrical systems could be giving you a problem.

Finally, put in a call to the tower or UNICOM and ask for a radio check. If you are still bothered with static, whining, buzzing, or squealing noises from your receiver or with needle deviation or limited range in flight, ask your mechanic to inspect the cables that connect your antennas to your radios. Sometimes the cables are bundled close to electrical wires or other cables without proper shielding. Or occasionally the antenna cable becomes distorted from the effects of a nearby heat source.

Only when you are perfectly satisfied that the whole antenna system is healthy are you on sure ground in pointing an accusing finger at the radios. Chances are that if you keep the gremlins away from your airframe the black boxes will do a pretty good job. There's hardly room inside them for mischief-making. □

(Technical Advisers, Eugene Sherman, Airworthiness Standards and James Coyle, Communications Specialist, NAFEC. Graphic material from "Every Pilot's Guide to Aviation Electronics," by J. M. Ferrara, 1976, EL-JAC Publishing Corp.)

One Engine Out

A Close Look at Single Engine Performance in Twins

The official investigation statement was brief and grim: "At the airport the night sky was dark but clear and the visibility was about 15 miles. After takeoff the aircraft climbed to an altitude of between 50 to 100 feet above the runway, where the left engine failed. The aircraft turned to the left, descended abruptly into a field, exploded, and burned. All occupants—the pilot and five passengers —died in the crash."

The National Transportation Safety Board determined that the probable cause of this accident, which took place at Chillicothe, Mo., was engine failure at a point where ". . . the airplane's single-engine performance in the takeoff configuration and its height above the ground combined to make the pilot's ability to sustain flight marginal."

Statements of this kind appear to question the popular assumption that when it comes to flight safety two engines are always better than one. There is, unfortunately, not enough data available to settle the issue of whether pilots of equal ability and experience are less likely to have an accident related to engine failure in a twin, or in a single-engine aircraft.

We know that there are about 800 accidents each year (in recent times) following power loss in single-engine airplanes; and only about 48 accidents per year following loss of engine in twins. But no useful conclusions can be drawn from these figures, regarding the safety margin provided by the second engine on an airplane because we have no reliable data on the respective hours of usage —or on the engine failures that do not result in an accident.

One important point that appears beyond dispute is that pilots who have never experienced engine failure in a twin under critical conditions are apt to over-estimate the degree of flight control that would remain available to them after such a power failure. Many pilots would find it hard to believe that in some circumstances light twins, after losing power in one engine, are capable only of *a controlled descent*. Such lack of understanding lies behind the high rate of fatalities in accidents following power loss. About *one out of every three* of the 146 engine-out accidents in twins reported during a recent three year period, 1975-77, were fatal.

What about the Federal Aviation Regulations? Do they not require multi-engine airplanes to be able to climb on one engine? That depends on the airplane weight, engine, altitude, temperature, category of certification, and performance ratings. Airplanes certificated in the transport (over 12,500 lbs.) category, for example, and turbine powered twins are required to operate at weights which permit maintaining specified climb gradients. Airplanes weighing between 6,000 and 12,000 lbs.) with two reciprocating engines —which includes a great many general aviation twins—must be able to maintain a steady rate of climb at 5,000 feet under the following conditions:

1. Inoperative engine feathered.
2. Remaining engine at not more than continuous maximum power.
3. Landing gear retracted.
4. Wing flaps in the most favorable position.
5. Cowl flaps as described in the flight manual.

If the airplane weighs 6,000 lbs. or less, and has a stalling speed, with flaps and gear extended, of 61 knots or less, certification requires only that "the steady rate of climb at 5,000′ " be *determined* (under the above conditions). There is *no* minimum climb rate.

Generally, the performance charts of light twins certificated in this category show single-engine climb capability up to 5,000′, in the clean configuration, in the range of 200-300 fpm. (See Fig. 3.) But remember, these performances were recorded with a factory-fresh airplane—flown by a highly skilled test pilot flying precisely at the best rate of climb speed under ideal weather conditions. Although 200 to 300 fpm may sound like a good climb rate for one engine, consider some of the factors that can erode that apparent safety margin:

- **Landing Gear.** If one engine fails while the landing gear is still extended, the potential single engine climb rate would be reduced by approximately 200 fpm. In some aircraft the act of gear retraction (opening of wheel well doors) causes a temporary additional *increase* in drag, which could be critical at minimal airspeeds.
- **Flaps.** If the wing flaps are not retracted to optimum position for climb, as much as 75 to 100 fpm of climb rate could be lost for each 10 degrees of deflection. If the cowl flaps on the dead engine are not closed after power failure, an additional 25 to 50 fpm could be lost from the climb rate.

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Extended landing wheel is mute evidence why this light twin, following engine failure after takeoff, was unable to maintain altitude. →

The effect of a maximum load of passengers and/or cargo on the single engine performance of a light twin must be considered by the pilot.

Good engine maintenance assures optimum single engine performance. NTSB records indicate the likelihood of fatalities in engine-out accidents is four times greater in light twins than in single-engine aircraft.

• **Propeller drag.** A windmilling propeller can cut the potential climb rate by 100 to 200 fpm. Like all aerodynamic drag it increases as the square of the velocity increases. On the other hand, an overhasty feathering of the wrong propeller leads to zero thrust, and a very rapid descent. As ridiculous as it may sound, this is a common cause of accidents. The failed engine must be identified by control response and verified by throttle reduction before it can be feathered safely. The harried pilot who has an engine failure at a critically low altitude could easily feather the wrong engine or forget the feathering step completely unless he practices engine-out emergencies often and is mentally prepared at all times.

• **Flight control.** The optimum climb performance speed with one engine out is possible only if the yaw and roll condition brought about by the inoperative engine is countered with the most effective use of rudder and aileron. Optimum performance with one engine out is achieved, in most light twins, with a 3° to 5° bank toward the good engine and appropriate rudder pressure to maintain heading. An imprecise procedure will increase the drag and reduce the climb rate. Furthermore, any deviation from best single engine rate of climb airspeed (either above it or below it) will result in a diminished climb rate.

• **Altitude.** A significant reduction in climb capability must be expected if the engine loss occurs at a density altitude in excess of 5,000′. The manufacturer's performance chart for one typical light twin at maximum gross shows a single engine climb rate of 350 fpm at sea level and standard temperature, which is cut down to 150 fpm at 5,000′ and down to 75 fpm at 7,000′.

• **Weight and balance.** Weight is a direct factor in climb performance. A typical light twin at a maximum gross weight of 5,000 lbs will have only about 50 percent of the single-engine climb rate it has at 4,000 lbs. Excess weight will reduce the climb rate proportionally and forward C.G. climb also degrade performance.

• **Power.** An airplane with engines that have gone a long time between overhauls and are not delivering fully rated horsepower is not going to climb according to the book, when one engine quits. Low compression or weak ignition may be overlooked when both engines are functioning, but any lack of maintenance will be very evident when the airplane tries to climb on one engine. Some pilots assume that because they have two engines they can afford to be a little more casual about maintenance—a very unrealistic assumption. An inoperative engine is a very burdensome performance handicap to carry.

• **Airframe.** Usage likewise tends to slow an airplane by marring the streamline condition of the fuselage and wings. Misfitting doors and hatches, popped rivets, small dents or disfigurations, even chipped or rough paint, all contribute to an increased wind resistance and reduce the margin of safety for single engine performance in a light twin. Structural icing, of course, can be even more destructive of normal airflow.

• **Environment.** If an engine quits after dark or when visibility is restricted by weather, chances are that pilot performance will be affected—especially with only a one-man crew. The pilot has to maintain control of the airplane while going through all the steps in his emergency procedure and this may take longer in the dark or in clouds. At airports he may have trouble seeing obstacles to flight and at altitude he may have no visible reference to the ground or the horizon. In a real-life situation the pilot may not make any *big* mistakes, but his margin of error could be too slim for even small mistakes.

Turbulence, incidentally, is another little recognized environmental factor which degrades potential climb rate with one engine out, and increases control problems. The reported or possible presence of *windshear* should be regarded as particularly hazardous.

The fatal accident mentioned at the beginning of this article, which took place on takeoff at 9:16 p.m., at Chillicothe Municipal Airport in Missouri, is a typical example of the pressures brought to bear on the pilot when he experiences an engine failure in the dark. According to the NTSB investigation, the aircraft was between 50 and 100 feet above the runway when the left engine failed (because of a broken crankshaft). The light twin, a Beech *Baron 58*, was capable of climbing about 300 fpm at the runway altitude with one engine out, its propeller feathered, flaps and landing gear retracted.

Piper Navajo

According to one witness, the airplane climbed to an altitude of between 100 and 150 feet, before stalling and plunging to the ground. Flaps were retracted but not the landing gear—which would have degraded the twin's single engine climb performance by about 200 fpm. The Safety Board concluded that "since the pilot did not perform the first item on the engine failure procedure (retracting the gear), he did not manually feather the propeller, which windmilled for an indeterminate period before going into an autofeather position." The windmilling prop would have cost the airplane (approximately) 200 fpm in potential climb rate—resulting in a rate of descent of about 100 fpm at the full gross weight of the airplane. Although the pilot was properly certificated and experienced, the Board found that his ". . . ability to maintain flight after the engine failed was marginal because of nighttime conditions, the aircraft's low altitude, and the aircraft's inability to climb or maintain level flight in the takeoff configuration with one engine inoperative and its propeller windmilling."

Another fatal accident to a light twin that took place after nightfall, in Australia as it happened, is significant because of the manner in which the Australian Department of Transport arrived at the probable cause. The pilot, also very experienced, had taken off from Runway 34 at Melbourne Airport shortly after midnight, alone on a cargo run in a Piper *Navajo Chieftain*. Using an intersection departure, he had climbed the airplane to a height of from 100 to 200 feet above the ground when he reported a fire in his right engine. He asked for and received permission to land on Runway 27, commenced a shallow right turn toward the runway, but descended and struck the ground before completing the turn.

Examination of the wreckage disclosed that landing gear and flaps were fully retracted, and the right propeller had been feathered. The *Chieftain's* operating manual indicated that the airplane should have been able to maintain a climb rate of 220 fpm at maximum gross weight for the given conditions of departure.

However, the *Chieftain* had been slightly overloaded, in excess of 143 lbs., which investigators calculated to have cost the airplane *25 fpm* in single-engine climb rate. Another *40 fpm* was believed to have been lost because of the bank angle of the turn, estimated as having been 15 degrees away from the live engine. The airplane had logged about 3,400 hours of use, resulting in a "normal" deterioration of the airframe streamlining which investigators believed reduced the potential climb rate by *100 fpm*. Finally, the turbocharger of the left engine was found to have been incorrectly adjusted, to the extent that the remaining engine could develop only about 300 brake horsepower, instead of the rated 350 BHP. Investigators believed this reduced the climb rate with one engine by another *75 fpm*.

The total estimated reduction in climb rate was 240 fpm, which could explain why the pilot was unable to prevent the premature descent, despite having a clean configuration.

Postcrash investigation of this accident also revealed that the apparent fire in one engine was actually an oil leakage dripping on the hot exhaust pipe. Under daylight conditions the pilot might have observed that it was possible to control the problem with reduced power, instead of shutting down the engine completely before reaching a safe maneuvering speed or altitude.

Given the multitude of factors which could lead to loss of control in a light twin after an engine failure, it is apparent that pilots of these airplanes are in no position to relax their vigilance in the cockpit simply because they have more than one powerplant. From one point of view, two engines make it more unlikely that you will find yourself without power in flight; but from another view point two engines means *a greater likelihood of an engine failure*. Losing one out of two engines in flight gives you more options than power loss in a single engine, airplane to be sure, but this also means more opportunities to make a mistake. Losing an engine cuts your power in half, but reduces your climb capability by 80 to 90% of all engine climb. This is due to the high drag condition resulting from the inoperative engine and consequent control deflections.

Are certain types of pilots unable to handle this kind of emergency? A survey of 146 pilots involved in twin accidents following failure of one engine, during the period 1975-1977, does not lead to any specific profile. The pilots' ages varied from 20 to 69; experience ranged from 416 hours to 25,000; and time in type from three hours to 790.

Most of the pilots held commercial or ATP certificates. Airplane usage was divided fairly evenly between pleasure, business flying, and commercial operations.

One surprising statistic is that during this three year period 94 of the 146 accidents followed an engine failure *at altitude* (in cruise or descending), as opposed to 52 that followed engine failure on takeoff/climbout. It is obvious that sudden power loss during the takeoff procedure can be critical; but it is less apparent why the pilot who is in a position to trade off altitude for airspeed should be unable to maintain control and complete a safe landing. In most of these cases the pilot was not able to position the aircraft properly on final approach and either landed short, over-ran the runway, or stalled during a go-around or turn.

Fourteen pilots did not feather the windmilling prop, and two feathered the wrong propeller; nine pilots failed to retract flaps as recommended, and one extended flaps too soon on approach; two pilots failed to retract the landing gear following engine failure after takeoff; four extended the gear too soon while maneuvering on approach to land, and three did not extend the gear on landing.

Beech Baron 58

However, most of the engine failure accidents took place not simply as a result of an error or forgotten duty but because the pilot ignored the limitations of the airplane. Commonly, adequate airspeed was not maintained, resulting in complete loss of control. Possibly the pilots were distracted by unknown problems; or possibly they had never accepted the fact that in a light twin the safety margin is considerably smaller than it is for heavier or turbine powered airplanes, where the available power is greater.

Light twin flying can be made much safer if the pilot is willing to prepare himself for possible power loss on every phase of every flight. To do this he must, of course, be thoroughly familiar with his manufacturer's recommended engine out procedure and performance data. In addition, there are two basic engine-out concepts which every pilot of twins should understand fully: *minimum control speed,* and *best single-engine rate of climb speed.* These are indicated for you (on recently manufactured aircraft) by the red and blue radials, respectively, on the airspeed instrument, but their significance goes far beyond simple figures.

1. **Minimum control speed, Vmc** (red radial). The single-engine pilot normally associates a stall, or loss of lift with loss of control. The twin-engine pilot (except for in-line twins, like the Cessna *Skymaster*) must also be concerned with loss of *directional control.* A twin with engines on the wing, after losing power in one engine, will yaw strongly toward that engine under most conditions of flight. The yawing tendency can be countered by the rudder, if there is sufficient airflow over the tail (i.e. airspeed). Vmc, as determined by the manufacturer, is the *minimum airspeed at which it is possible to recover directional control of the airplane without exceeding a 20 degree heading change, and thereafter to maintain straight flight with not more than* five degrees of bank.

The red radial indication is for a standard day at sea level, with full power, most unfavorable center of gravity, flaps in takeoff position, landing gear retracted, and dead prop windmilling. However, some airplanes will not maintain level flight at or near Vmc, let alone turn or climb.

Vmc will enable you to make a *controlled descent*—that is all, but it is important. If you lose directional control under these conditions a stall or spin is a possibility.

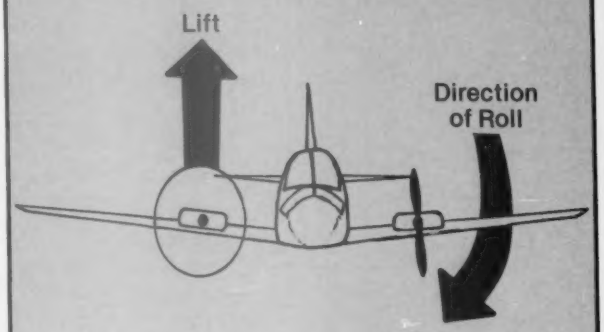
2. **Best rate of climb speed, single engine, Vyse** (blue radial). The blue radial is determined in the *clean configuration,* including feathered propeller, with the airplane flown at the recommended bank angle. Vyse is important even though it may not necessarily give you a positive rate of climb. It will make the most effective use of available power (least drag versus power ratio) whether you are climbing, holding level, or descending. The only exception in usage would be best (single engine) *angle* of climb speed, Vxse, when confronted by terrain obstacles.

There is little point and considerable danger in attempting to climb or turn the aircraft in level flight at speeds much below Vyse or Vxse with one engine inoperative. Loss of directional control or lift or both are likely. If you have not attained Vyse at or shortly after the point of losing one engine, your safest course is to descend straight ahead, under control, and accept the consequences.

Other considerations that will assure maximum safety in light twins include:

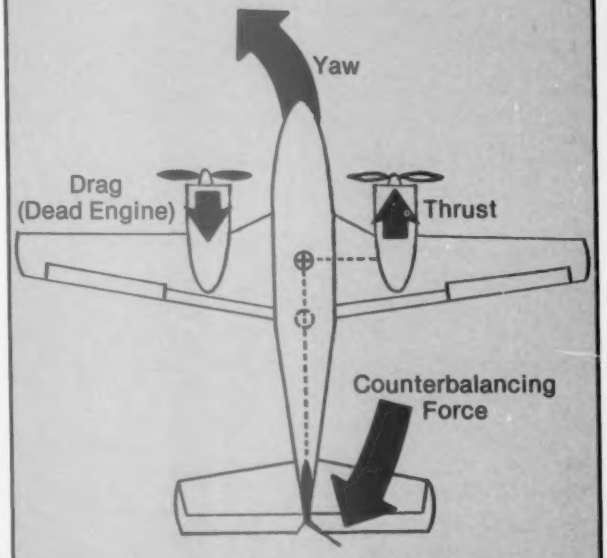
- **Emergency planning.** Never take off without first determining how you will handle a power loss during the takeoff or climbout in this particular airplane, with a specific weight and balance, and with the given weather and airport environmental conditions.
- **Do not take off if you are still on the ground when an engine fails.** Regardless of runway remaining, your chances are better on the ground.
- **Never lift off before minimum control speed (Vmc)** is reached, and preferably not before Vmc +5 mph, or the manufacturer's recommendation, whichever is higher. Do not wait until the fence is near to obtain Vmc. If you cannot achieve it after a normal run, abort the takeoff; something is wrong.
- **Achieve and maintain best all-engine rate of climb speed after takeoff,** noting when you attain Vyse. Following engine loss, main-

Figure 1.
Yaw and Roll.



With one engine out the airplane will yaw and roll toward the dead engine. Yaw is countered with opposite rudder; roll with opposite aileron. Yaw may exceed rudder control capability if airspeed is below the minimum control speed.

Figure 2.
Minimum Control Speed (V_{mc}).



The net yaw of the operating engine is determined by thrust plus "arm" leverage (distance of engine from center of gravity). The net counterbalancing force of the rudder is the airflow plus the arm or distance of the rudder from the center of gravity. V_{mc} is the airspeed required for the rudder to provide a counter yaw of equal magnitude to the yaw from the operating engine.

Figure 3.

Performance Loss of Representative Light Twins with One Engine Out, Sea Level

	All engine climb (fpm)	S.E. climb (fpm)	Percent loss
Beech Baron 58	1,694	382	80.70
Beech Duke	1,601	307	80.82
Beech Queen Air	1,275	210	83.53
Cessna 310	1,495	327	78.13
Cessna 340	1,500	250	83.33
Cessna 402B	1,610	225	86.02
Cessna 421B	1,850	305	83.51
Piper Aztec	1,490	240	83.89
Piper Navajo Chieftain	1,390	230	83.45
Piper Pressurized Navajo	1,740	240	86.21
Piper Seneca	1,860	190	89.78

Figure 4.

Critical Engine.

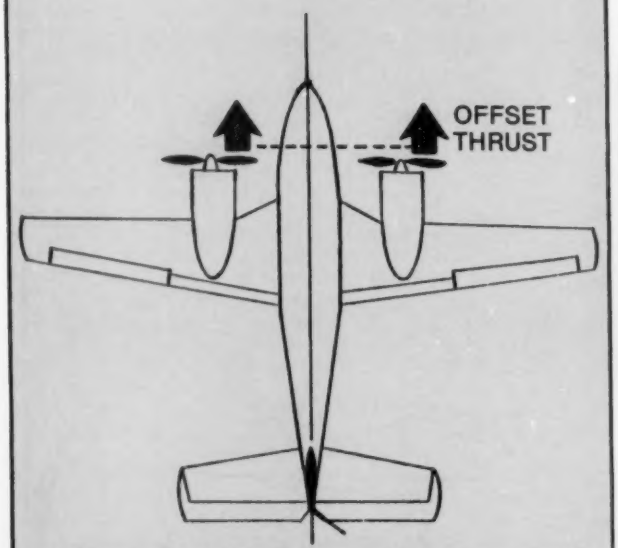


Illustration shows that thrust in twins (unless they have counter-rotating propellers) is offset to the right, producing a left yawing tendency at high angles of attack and high power settings. Failure of the left (critical) engine adds "normal" yaw to the yaw from assymetrical thrust, making directional control more difficult.

tain Vyse on approaching to land until you are committed to the landing; do not attempt to go around on one engine if at less than Vyse.

- **Avoid intersection takeoffs.** They reduce your options for aborting the takeoff, in the event of an emergency. Visualize the distance at various segments of the runway, so you know how far you can go after liftoff and still set the airplane back down on pavement.
- **Avoid marginal conditions.** Make sure that if you lose an engine on takeoff or climbout you will not have to struggle back to an airport that is below landing minimums, or have to dodge obstacles that are shrouded with clouds—you will be busy enough as it is. If you are right up at maximum gross weight, avoid a nighttime departure if possible, or a minimal length runway. In other words, you can choose not to put yourself in a position where you will have very little margin of error, even if that means postponing a departure, avoiding a certain airport, or leaving something or someone behind.
- **Practice emergency engine-out procedures in a realistic manner.** Not close to the ground, of course, but at altitudes that similate maximum gross weight with the actual payload on board. Learn just how your airplane is going to perform in the most adverse circumstances, and you may avoid some bad surprises.

A second engine on the airplane can be looked upon as a fail-safe component only to the extent that you are capable of flying with a power source on one wing and a mass of wind resistant material on the other. In light twins, this is a form of precision flying that is very intolerant of mistakes, and does not give you much opportunity to learn from experience. You usually have to do it right the first time. □

SOME DEFINITIONS

Critical Engine. The engine whose failure in flight would most adversely affect control and performance. In American-built airplanes (with propellers turning clockwise to the pilot), normally the left engine, since the right engine alone produces the greatest amount of yaw and roll. Exceptions are airplanes with counter turning propellers, like the Piper *Seneca*, or push-pull twins like

Cessna Skymaster

the Cessna *Skymaster*. However, in the *Skymaster* the rear engine is considered critical, since the pusher prop is more effective than the tractor. Failure of the rear engine in this airplane may go unnoticed by the pilot, unless he checks his instruments.

Vxse—Best *angle* of climb speed, one engine out. Produces more rudder drag than best rate of climb, so use only as needed (altitude vs. distance).

Vsse—Safe single-engine airspeed. Never cut an engine intentionally below this airspeed. Use only for training, and *at altitude*. This is an industry concept, not an FAA computation, and performance will be affected by airplane and environmental conditions.

Blanche Noyes

The Grande Dame of Air Marking

Many a lost and lorn pilot, seeking worriedly to identify the nondescript hamlet below the wing of his sputtering airplane, has breathed a grateful sigh of relief to find the name of the town lettered broadly on the roof of a barn or side of a hill. The countryside of the United States, especially in the early days of flight, was ideal for flying because of the large areas of open space available for forced landings, but it was also very easy to get lost in during an emergency, when fuel was running low or the engine had given its last gasp. All of this changed during the middle 1930's, thanks in large measure to a remarkable stage actress-turned-aviatrix who became the patron saint of lost pilots.

Blanche Wilcox was born in Cleveland just after the turn of the century. The daughter of a construction contractor, she displayed an independent character as a young girl, abandoned formal studies in favor of the stage, and became a well-known actress on Broadway and the popular theaters of the east coast. While starring in a melodrama called "White Cargo" in Pittsburgh in 1927, Blanche was invited to a dinner honoring America's newest hero, Charles Lindbergh, then touring the country after his conquest of the Atlantic. Her dinner companion was a handsome local airmail pilot, Dewey Noyes, a vociferous advocate of aviation.

The deeply smitten Blanche was willing to listen to Dewey talk about aviation, or any other matter, for hours on end, as long as he talked only to her. She followed him out to the airport, became his confidante, his pupil (she soloed after four hours of dual), and within a year his wife. Her husband had prodded her into the cockpit with the argument, not entirely serious, that she could be living proof of how simple it was to fly "if even a silly woman could learn."

The first certificated woman pilot in Ohio and one of the first ten in the country, this diminutive darling of the stage became a tough-minded, bruised-knuckled racing competitor. Her first big race was the Women's Air Derby (later to become the annual "Powder Puff Derby") in 1929, from Santa Monica, CA, to Cleveland. Flying a Beech *Travel Air Speedwing*, Blanche experienced an engine fire over the Arizona desert, landed, put out the fire with sand, bent her landing gear on takeoff, landed on one wheel in Pecos, TX, made repairs, and kept on flying. She came into Cleveland three places behind Amelia Earhart, the winner, and fellow founder of the "Ninety-Nines" women's flying association.

Soon an aviation celebrity, Blanche was able to interest well-known business leaders in flying, including the then 91-year old John D. Rockefeller, Sr. who took his one and only airplane ride with her. Success as a racing pilot quickly brought Blanche prominent jobs as a demonstration pilot for aircraft companies, and she was also in demand as a lecturer on flying.

In 1935, after Dewey Noyes had taught Blanche instrument flying, the pair began seeking sponsors for an around-the-world flight which they hoped would be filled with adventure and excitement. Their dream came to an end in December of that year when Dewey was killed in an airplane crash.

The young widow found herself at a crossroads of life that seemed to offer no future. Dewey's death had soured her on flying for the moment, and her stage career was too far behind her to return to: *what else could she do?* As she mulled over the problem while "boring holes in the sky" with her airplane over Ohio farmland, she found herself thinking about the many fine pilots she had known who had perished in crash landings after becoming lost in bad weather over unfamiliar countryside. *If every local community could realize how important aviation would be one day, how much they could do to help by simply putting up some kind of marker that airborne pilots could read, how many fine young lives could be saved . . . Surely, she could persuade them.*

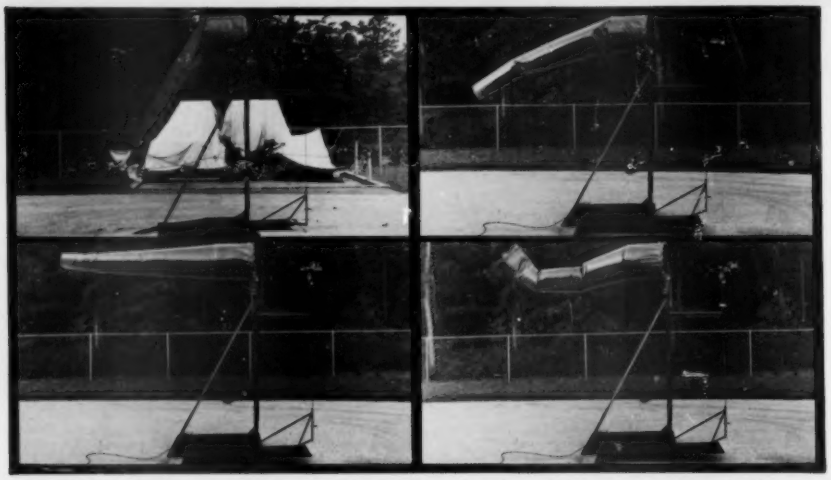
From that moment on, "air marking" became her passion and her vocation. Over the years ahead she continued to race successfully, winning the 1936 Bendix race, New York to Los Angeles, over a large field that included famous male pilots; breaking speed records; flying the mail; testing and demonstrating aircraft; but all this was secondary to her determination to identfy the nation's byways for airmen—a project she labored with for the next 35 years.

Blanche found an ally in the (Federal) Bureau of Air Commerce which was trying to start up a national program of air-marking. The nation was divided into 15-square mile segments, with hopes of locating an air marker in each—a grandiose plan that never fully succeeded. Appropriations soon ran out, but Blanche, who was officially appointed an air marking pilot in 1936, drummed up support from local chambers of commerce and other civic groups from one end of the country to the other. Soon thousands of towns and villages were displaying their name to the sky.

Wherever she flew, whenever she appeared at a banquet or forum or lecture hall or private salon, she never lost an opportunity to propagandize her favorite project. She succeeded so well that when World War II reached America in 1941, the War Department became concerned that her signs could aid enemy pilots who might penetrate our borders. Within a few months, some 2,000 air markers, located within 150 miles of the Atlantic or Pacific costs, were removed or screened over.

But the day the war ended, Blanche and her co-workers, spurred by the Ninety-Nines, were back at work getting the markers up again and new ones painted. Blanche flew endlessly, checking on existing markers, campaigning for new ones. By the time that Blanche retired as Chief of Air Marking for FAA, on January 1, 1972, over 75,000 communities had been identified for airmen.

The trophies, cups, gold and silver medals, awards, and other honors Blanche Noyes collected in 45 years in aviation were almost too numerous to be contained in her Washington, DC, apartment home. She is undoubtedly the most decorated woman pilot of all time, and she has known and been admired by most of the aviation greats of her era. She never regretted turning her back on the stage, and she still prizes, above all other honors, the fact that she was the first woman pilot ever hired by the United States Government. She knows Dewey would have been proud. □



SOCKS THAT STAY UP. A modern version of the venerable wind sock at general aviation airports has been developed by FAA's Experimental Center. The new sock, made of nylon coated with vinyl, should last up to a year and a half before tearing or fading. Testing has shown good characteristics for approximating wind velocity. The socks pictured above indicate (clockwise from upper left) 5 knots, 10-12 knots, 21-27 knots, and 25-30 knots. Field tests are being conducted at general aviation airports across the country.

Survey Shows Tachometer Calibration Errors Are Widespread

A recent nation-wide investigation of mechanically actuated tachometers in general aviation aircraft has disclosed that a high percentage of the tachometers are inaccurately calibrated. The random inspection of 2,517 aircraft of popular makes revealed that while most readings were within 75 rpm, plus or minus, of being accurate, some errors ranged from minus 300 rpm to plus 270 rpm. The greater part of these errors were negative (the engine turned faster than the tachometer indicated).

Generally, tachometers in older aircraft were found to be no less accurate as those in newer aircraft.

Operating an aircraft with significant negative tachometer error can shorten propeller fatigue life, making the hazards from nicks in the blades even more critical. Additionally, it can produce stresses beyond those anticipated in propeller design.

Negative tachometer error can also result in higher than anticipated fuel consumption, and may be a factor in some heretofore unexplained incidents and accidents involving fuel exhaustion. For example, applying the average tachometer error found on four typical general aviation aircraft to the performance figures of those aircraft revealed fuel consumption increased by as much as half a gallon per hour. Flight endurance was reduced by as much as 42 minutes, depending on aircraft fuel tank capacity.

A positive tachometer error, meaning the *engine* was lagging behind the tachometer and not developing *enough* actual power, could also pose safety problems, especially on takeoff in a high density altitude, at airports of high elevation, or when applying power for a go-around in such conditions.

Pilots whose planes have not had a recent tachometer calibration check might wish to be cautious about planning flights near the aircraft's maximum fuel range.

Checking the accuracy of tachometers is a routine maintenance operation that requires no disassembling of the aircraft engine or instruments. Significant errors, however, should be corrected by a qualified maintenance facility (usually an instrument shop).

Tighter Commuter Security

The security regulations covering scheduled air carriers would be extended to commuter airplanes carrying 20 or more passengers under a Notice of Proposed Rulemaking published November 1, 1979. The Airline Deregulation Act of 1978, which has led to many small commuter airlines taking over segments formerly flown by major carriers, requires the smaller airlines to maintain equivalent security wherever feasible.

The NPRM cited 43 hijackings in the past 10 years of commuter activity, with 24 of the 43 occurring after stricter measures were instigated for certificated air carriers. Following airline deregulation, commuters and air taxis now publish their schedules, which increases their vulnerability to potential hijackers.

Previously commuter pilots were only required to be acquainted with emergency inflight procedures in the event of a hijack. Passenger and luggage screening would become mandatory, if the proposal is enacted, and procedures for protecting planes from unauthorized access would be followed. Provisions for X-raying or hand examination of carry-on baggage would also be required.

Commuter operators of airplanes carrying 19 or fewer passengers would be required only to verify the identity of each passenger prior to boarding and to keep the planes from unauthorized access.

Comments will be accepted until February 29, 1980 and should be sent in duplicate to FAA, Office of the Chief Counsel, ATTN: Rules Docket (AGC-24), Docket Number 19726, 800 Independence Ave., S.W., Washington, DC, 20591.

Hazard in Avgas Thefts

Pilots have reported recent thefts of fuel from parked airplanes which could have resulted in inflight accidents. In Riverdale, CA, thieves not only removed the fuel from a *Skyhawk* but also removed some of the valves and fittings, with the result that the fuel systems probably would have failed in flight if the aircraft had been refueled and flown without proper inspection. Fuel thefts appear to be on the increase: In spite of the fact that many pilots now lock gas caps, fuel can be taken from fuel drains and petcocks, which cannot be locked.

Safety Seminars Sweetened

Pilots who attend FAA-approved safety seminars in 1980 will be eligible for $25,000 worth of flight instruction gift certificates plus a drawing for a $50,000 airplane of their choice. Prizes are being given by the General Aviation Manufacturers Association (GAMA) as part of their year-long drive, "Safe Pilot '80," in support of FAA's Accident Prevention Program.

Safety seminars will be held at intervals in all sections of the country. For local schedules consult your FAA Flight Standards District Office or contact GAMA, Suite 517, 1025 Connecticut Ave., N.W., Washington, DC 20036.

New Commuter Standards

The Civil Aeronautics Division of Transport Canada has published a new Air Tourist Information pamphlet (TP771) for pilots flying to Alaska over Canada, especially along the ALCAN highway. The pamphlets are available to pilots at FAA Flight Service Stations and GADO's and FSDO's along the southwestern Canadian border and in Alaska. Another Transport Canada pamphlet (TP2166), "Flying the Alaska Highway in Canada," is available from Transport Canada, Place de Ville, Ottawa, Ontario, Canada, K1A ON8, Attn: SLPP.

• Checking Up On Doc

I would like to comment on the article "Density Altitude and the Maximum Climb" in the October 1978 issue. Most airplanes today have performance information which includes the effects of temperature. Manufacturer's Handbook or Owners' Manual has performance data for takeoff ground roll and total distance over a 50-foot obstacle, including such variables as temperature, altitude, surface, and wind conditions. This information is required to be in the aircraft, so shouldn't the Engine Doctor have suggested checking it?

Carlos L. Blacklock
Wichita, KS

The Engine Doctor's article was for special conditions in high elevations, which would not necessarily be covered in the owner's manual.

• Tach Settings and Prop Tip Stresses

I recently came across the article "How Sharp is Your Tach?" in the Nov/Dec 1977 issue and now I'm hesitant to use full power for takeoff because I don't want to overstress my propeller and lose it "up there." What to do?

M. M. Furney
Panama City, FL

With normally aspirated engines always use full power on takeoff. The chart in the article you refer to is for full throttle, level flight. The figures do not apply on takeoff.

You might also have a calibration check run on your tachometer. See page 14 of the Jan/Feb 1980 issue.

• Midair! Midair!

Why was the "N" number changed on the airplane on the cover of the September/October 1979 *General Aviation News?*

Would it be on account of how close you came to him in taking the photograph, and perhaps he would be able to identify the FAA as the culprit and file a near-miss report? Or was this taken by a tower operator whose attention the pilot was attempting to raise?

G. S. Waltman
Gt. Neck, NY

No cover-up intended. The photo was taken with a telephoto lens at a safe distance, but the layout artist assumed we might have had some reason not to identify the owner. He evidently did not fool you or some of our other eagle-eyed readers.

• Hanging by a Thread?

The author of "Inside the Fuselage" (May/June 1979 issue) tells of his apprehension when looking at the thin elevator steel cable on which his life depended. My emotions were similar when I first saw the two stabilator pins on which my life literally hangs in my *Seneca II*. The pins, the only connection between the tail and the fuselage, looked slightly thicker than a pencil. I realize the stabilator carries only a minor part of the aircraft's weight, but I shudder to think of those pins breaking in turbulence.

Felix Voirol
Fullinsdorf, Switzerland

According to manufacturer specifications, each of these two pins, or bolts, has a shear strength of 4,650 pounds. The maximum gross weight of a Seneca II *is 4,750 pounds, of which the stabilator carries a relatively small load, so there is a margin of safety. A check with the Maintenance Analysis Center revealed no Service Difficulty Reports on the pins on the PA-34.*

• Attitude or Angle-of-Attack Indicator?

At one point in the "Stall Awareness" article, which appeared in the September/October 1979 issue, the writer said. ". . . since most light general aviation aircraft do not have attitude indicators . . ." On the contrary, one would be hard pressed to find an airplane these days without an "attitude indicator," otherwise known as an artificial horizon.

William H. Hutchin
Hayward, CA

Although not a required instrument, the attitude gyro (or attitude indicator, artificial horizon, whichever you prefer) has been standard equipment in general aviation for many years. The intended phrase in the article was 'angle-of-attack indicator" which is not so so widely found in light aircraft.

• The Missouri Pheasant

Please advise if enclosed copy of Pheasant Aircraft Bulletin is the same company mentioned in the Famous Flight article on Steve Wittman in the May/June issue.

Louis L. Noble
Dow, IL

Pheasant
AIRPLANES
Bulletin No. 1 MEMPHIS, MISSOURI November, 1927
Recognizing the great achievements made by modern aircraft during the past year the Pheasant Aircraft Co., Inc., of Memphis, Mo., is organized for the purpose of doing its part for the advancement of this up-to-date method of transportation. America is surely "Taking to the Air."
We offer for your approval a new Commercial Airplane herein described.
PHEASANT AIRCRAFT CO., INC.
MEMPHIS, MISSOURI

The very same. Many thanks for providing us with the brochure.

• Again, Logging Time

In your "Logging Time" in the March/April 1979 *General Aviation News*, you refer to crosscountry "legs." I can find no reference to legs in the regulations. Also, there is apparently no requirement that you fly nonstop between these points on a crosscountry, so could a student pilot take an overnight crosscountry?

William E. Barnes
Lanchaster, CA

Reference to portions of crosscountry flights as "legs" does not appear in the regulations but is used in pilot jargon. For the private certificate, the regulations call for "ten hours of crosscountry flight, each flight with a landing more than 50 nautical miles from the point of departure and one with landings at three points, each of which is more than 100 nautical miles from each of the other two points . . ." While not a general practice an instructor could approve an overnight crosscountry flight for the purpose of this requirement.

FAA GENERAL AVIATION NEWS welcomes comments from our readers. No anonymous letters will be used, but names will be withheld on request. Address: FAA GENERAL AVIATION NEWS, AFS-807, Washington, D.C. 20591.

• "AM Weather" in Georgia

Which stations in Georgia broadcast the home weather show referred to in *FAA General News* issue for September/October 1979?

Joe L. Sims
Commerce, GA

Public Broadcasting Stations WGTV (Channel 8) in Athens, Georgia and WETV (Channel 30) in Atlanta both broadcast the home weather show. Check your local listings for the time. Individual inquiries for specific areas can be made at local FAA General Aviation District Office.

• Change of Address

I am a student pilot with a student certificate and 2nd Class Medical. I will be changing addresses shortly and would like to know if a student pilot must comply with FAR 61.60 requiring that Oklahoma City's Airman's Certification Branch be notified? If so, will I get a new certificate with whatever endorsements I already have?

Name Withheld

Affirmative. Send your name, old address, new address, Social Security Number, and certificate number. No new certificate will be issued, but the address change will be in the computer. Unless this is done, the student certificate—or any pilot certificate, for that matter—is invalid after 30 days from the move.

• Meet Your Airplane

Our company has published a safety pamphlet called "Meet Your Aircraft." The pamphlet makes a good open book quiz (with answers) about the operating characteristics of the pilot's particular aircraft and also covers some important FAR's and weather data. We are supplying complimentary copies which may be ordered from the FAA Accident Prevention Staff AFO-806, Washington, DC 20591.

Fred McGowan
Ins. Co. of N.A.
Philadelphia, PA

INSTRUMENT CORNER

• Visual Descent Point and MAP

What is the difference between the Visual Descent Point and the Missed Approach Point, if any?

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The Missed Approach Point, MAP, is the point on the approach course of an instrument landing at which the approach must be discontinued and a missed approach procedure initiated if runway environment is not clearly visible to the pilot.

The Visual Descent Point, VDP, is a predetermined point on the course of a non-precision DME/VOR approach at which normal descent from the Minimum Descent Altitude may commence, provided the runway is visible. The purpose of VDP is to help the pilot establish a normal descent-to-land angle. The purpose of MAP obviously is to terminate an approach when visibility to the runway is insufficient.

VDP, identified on approach charts by the letter V, is being introduced in selected non-precision approach procedures. This is not a required procedure.

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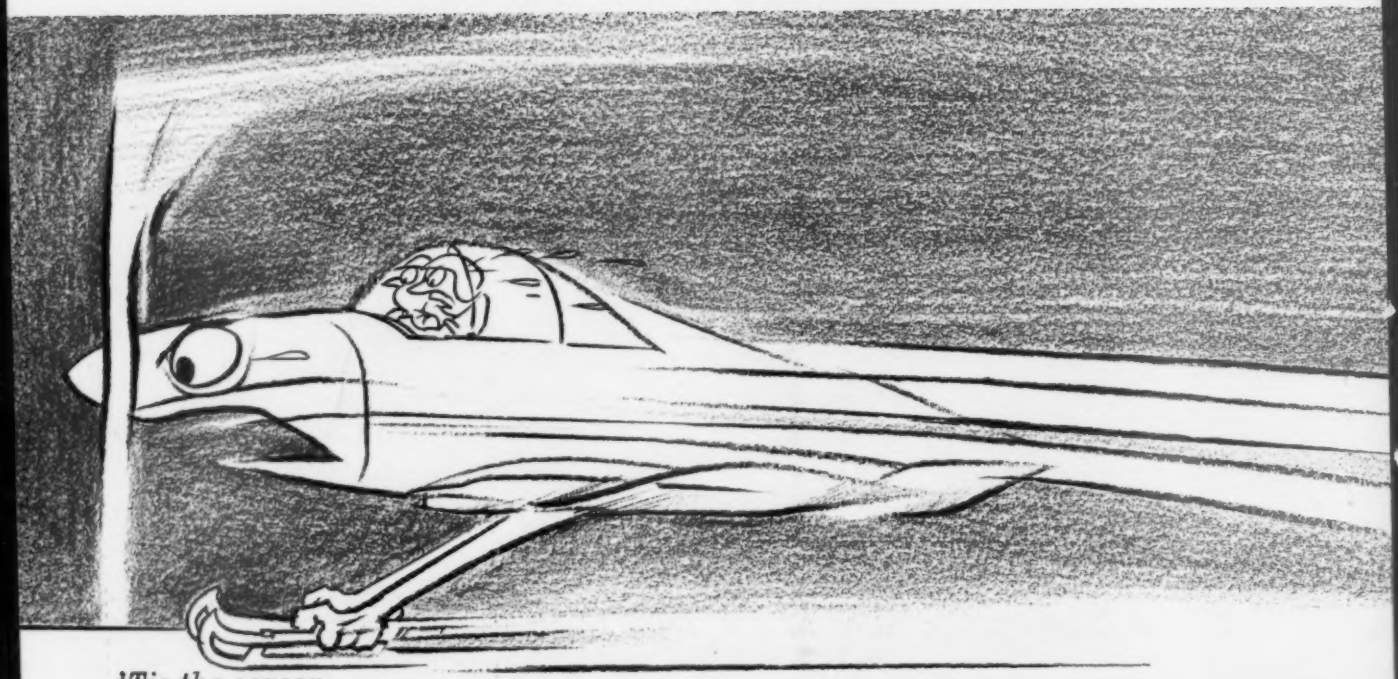

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